Smoking and cognitive complaints

Chapter 9

Smoking and cognitive complaints

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ABSTRACT

In this chapter, we focus on smoking behaviour in the MAAS–A_1 panel study, in relation to memory complaints. A total of 2,043 subjects were investigated. The results indicate that 69.1% of 2,043 subjects aged 25-85 years did not smoke, whereas 30.9% did. Memory complaints were generally less prevalent in the smokers, and separate analyses for four age classes (25–35, 40–50, 55–65 and 70–85 years) showed that the prevalence of memory complaints was lower in the middle aged group who smoked mildly or moderately. The results are taken as additional evidence that smoking and cognition are related. The present results do not give any information as to possible causal relationship between the two.

INTRODUCTION

Smoking has been reported to have a negative association with the prevalence of Alzheimer's disease. These findings were interpreted as a possible protective effect of smoking against the development of the cognitive dysfunctions seen in Alzheimer's disease (van Duijn & Hofman, 1991). However, other studies found a positive relationship, or no association at all (Fratiglioni, 1993). These conflicting results may have been caused by differences in methodology between studies. The issue of whether nicotine has a potential effect on pathological aging is of importance because of the cholinergic action of nicotine and the known cholinergic deficit in Alzheimer's disease (Kopelman, 1986; Sunderland, Tariot, Weingartner, Murphy, Newhouse, Mueller, et al., 1986). Besides, nicotine is a CNS-stimulant and as such can play a role as a cognition-enhancing drug (Clark, Brater & Johnson, 1988; see also Chapter 15).

There is little information about the relationship between cognitive aging and the use of nicotine. One study (Hill, 1989) investigated the effect of

smoking on cognitive performance in normal aged subjects. No differences between smokers and non-smokers were found, except on measures of psychomotor speed, where smokers had performance decrements. A review by Warburton (1992), however, suggested that smoking had positive effects on cognitive performance in healthy volunteers and patients with dementia of the Alzheimer type. In this respect, it would be relevant to obtain data on smoking in relation to cognitive complaints and cognitive performance in non-demented subjects of various ages. The present study uses information obtained for a large population sample by the postal survey of the MAAS–A_1 study panel. If nicotine has stimulating or protective effects on cognition, these effects should be detected in a normal population sample.

METHODS

Subjects

All 2,043 subjects (aged 24 to 86 years) that were drawn randomly from the RNH register (see Section 3.4) filled in the postal survey, as part of the MAAS panel study A_1.
The original 13 age classes were collapsed into four groups with approximately equal cell sizes: 25–35 years, 40–50 years, 55–65 years, and 70–85 years.

Variables of interest

The factors age and smoking behaviour were used as independent variables. A second independent variable was the factor 'smoking'. Actual smoking behaviour was measured as an answer to the question: "Do you smoke?" in the postal survey. If the answer was "yes", an additional question asked for the frequency of smoking, resulting in the following scores: 0=no smoking; 1=less than 10 a day; 2=10–20 a day; and 3=more than 20 a day (unit: 1 cigar = 1 pipe = 2 cigarettes). The factor 'forgetfulness' was used as a dependent variable. 'Forgetfulness' was derived from the question: "Do you consider yourself forgetful?" The answer scored could be "no" (1), "yes" (2) or "don't know" (3).

Statistics

The strength of the association between cognitive complaints and smoking was assessed by the odds ratio as an estimate of the relative risk. The relative risk (*RR*) is presented with a 95% confidence interval (Sackett, Haynes, Guyatt & Tugwell, 1991). Since age was expected to modify the effect of smoking on forgetfulness, age class was taken into account in a logistic regression analysis. The significance level reached with the *Wald*

statistic was used to assess the significance of the *RR*. All analyses were performed using the SPSS programme series (Norusis, 1993)

RESULTS

Information was available for 2,043 subjects. Of the total sample of subjects, 60.8% did not have memory complaints, whereas 39.2% did complain of memory dysfunction. As can be seen in Table 9.1, memory complaints increased significantly with age (chi^2=57.6, df=3, p<.01). Moreover, 69.1% of the respondents did not smoke, whereas 30.9% did. When smoking in different age groups was studied, it was found that the older the subjects were, the less they smoked (chi^2=63.8, df=3, p<.01).

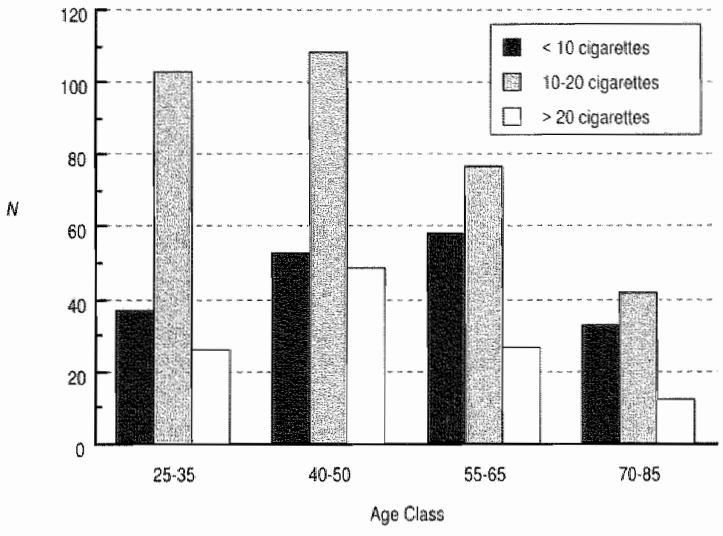

Fig. 9.1.
Smoking behaviour as a function of age.

Table 9.1.
The frequencies of subjects smoking and complaining of memory dysfunctions over different age-groups.

	25-35 years	40-50 years	55-65 years	70-85 years	Total
N	481	511	529	465	1,986[1]
Memory complaints	142	175	220	242	779
	(29.5%)	(43.5%)	(41.6%)	(52.0%)	(39.2%)
N	486	514	542	482	2,024[2]
Smoking	166	210	162	87	625
	(34.1%)	(40.9%)	(28.9%)	(18.0%)	(30.9%)

Note. [1]Fifty-seven and [2]19 subjects were missing due to non-response.

Table 9.2.
The frequencies of smokers and non-smokers and subjects complaining of memory dysfunction.

	Memory complaints			
Smoking	No	Yes	Total	
No	813	547	1,360	(69%)
Yes	390	222	769	(31%)
Total	1,203 (61%)	769 (39%)	1,972[1]	(100%)

Note: [1] Seventy-one cases were not included due to non-response.

Figure 9.1 shows more detailed information about smoking behaviour among different age groups.
A trend towards significant inverse association between smoking and memory complaints could be found with logistic regression analysis. The relative risk was .85 (95% *CI* .69–1.03, *Wald*=2.76, *df*=1, *p*=.10). This significant negative association between smoking and forgetfulness indicates that, generally, memory complaints were less prevalent in the group of smokers. The relationship between smoking and forgetfulness is displayed in Table 9.2.

To adjust for possible confounding and/or modifying effects of age on both smoking behaviour and forgetfulness, age class was taken into account in a logistic regression analysis. Logistic regression was performed with smoking, age class, and the interaction between smoking and age class as independent variables. The interaction between smoking and age classes was trend significant (*RR*=.92, *Wald*=3.03, *df*=1, *p*=.08). Since age class modified the effects of smoking (the elder subjects smoked less) and because cohort effects can be expected to have a strong influence on both the dependent and the independent variables, separate analyses for each age class were done for the effect of the different levels of smoking on forgetfulness. The first level (non-smoking) was taken as a reference group. These analyses indicated that in the youngest group and oldest group smoking did not affect forgetfulness (*Wald*=4.25, *df*=3, *p*=.24 and *Wald*=.42, *df*=3, *p*=.94, respectively). For the two middle-aged groups an effect of smoking was seen (*Wald*=8.0, *df*=3, *p*<.05 and *Wald*=9.71, *df*=3, *p*<.05, respectively). For the youngest middle-aged group, the prevalence of memory complaints was less in subjects who smoked fewer than 10 cigarettes compared to non-smoking control subjects (95% *CI* .21–.89, *RR*=.43, *Wald*=5.16, *df*=1, *p*<.05) while the older middle aged group had similar results as subjects who smoked 10-20 cigarettes (95% *CI* .28–.85, *RR*=.49, *Wald*=6.50, *df*=1, *p*<.01). The other levels did not reach significance.

CONCLUSION

In this study smoking had a small effect on cognitive complaints, in that middle-aged subjects who were mild or moderate smokers were characterized by fewer memory complaints than non-smoking subjects of the same age. Nonetheless, the results should be interpreted with caution. First, the results of our study may have been confounded by the rather large proportion of non-smokers in our sample. In the study of van Duijn and Hofman (1991), for instance, the control group consisted of 52.3% smokers and 47.7% non-smokers. However, the study of Hill (1989), which is more comparable to our study, included 85.5% non– or ex-smokers (69.7% non-smokers) and 14.5% smokers.

Secondly, the results derived from population studies should in general be interpreted with caution. First, retrospective self-reports are known not to be very reliable and valid reflections of actual behaviour. Hence, the actual performance on memory and other cognitive tests needs to be taken into account, and will be taken into account in a future project in MAAS in which the test results of subjects will be related to smoking behaviour. Future research will also focus on the effects of the duration of smoking. Also, smoking may be an intervening variable and an epiphenomenon of life style. Smokers may for example have a more active life style which could influence the report of memory complaints. These issues need to be taken into account in future studies.

Thirdly, an observed association is not by definition an indicator of a causal relationship. However, some of the rules for causal relationships, as defined by Sacket, Haynes, Guyatt, and Tugwell (1991), and applied to the relationship between smoking and cognitive complaints, do suggest that positive effects of smoking on cognition are present. For instance, in experimental designs the positive effects of nicotine on cognitive functions have been described (Wesnes & Revell, 1984; Warburton, 1992). Overall then, the present results underline the relevance of research into the effects of smoking on cognitive functions in healthy subjects.

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